Wood surface functionalisation using photoinitiators

Surface properties of solid wood and wood particles determine whether the materials can be coated, bonded or used in composite materials. By using photoinitiators which can turn light energy into chemical energy, the reactivity of wood surfaces can be increased and the uses of wood widened.

Background

Many processes for modern, high-value applications of solid wood and wood particles - such as adhesive bonding, coating or compounding - depend on a defined and elevated chemical reactivity or functionality of the involved surfaces. This project aims to develop novel methods which bind the superficial lignocellulose, typical of ligneous plants, to new functional groups which render the surface more reactive and lend it new properties. This is achieved with the use of phosphorous-based photoinitiatiors which turn the energy of light into chemical energy.

Aim

Treatments will be developed for two forms of wood based materials with a different application spectrum: for cellulose nanofibres (CNF) as a fibrillar, structural wood component and for solid wood surfaces in their native state. As a result of the different surface properties and the different application spectrum, researchers can pursue various modification strategies. When treating CNF, the challenge is to better adjust the surface properties, for example to improve adhesion of integration of wood particles in polymer matrices of composite materials. The aim of solid wood treatment is to make the surface more water repellent and insensitive to light.

Significance

The results gained in the project will enable the tailoring of the reactivity and functionality of wood surfaces. Such surface modifications have a high potential for innovations (e.g. application of nanotechnology) and are particularly important for high value wood utilisation such as coated wood for external use, engineered wood products for timber constructions or wood-plastic composites.

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